Significant Reduction in Environmental Impact of Aviation is Possible

Vehicle Estimated Improvements

- Fuel burn savings:
  - **Over 50% reduction from current aircraft**
- Emissions reduction:
  - ***Local air quality:***
    - **50% less NOx**
  - ***Global climate:***
    - **50% less CO_2**
- Noise reduction
  - **1/6th the objectionable ground noise footprint of current aircraft**

Green Aviation – Noise Reduction

Current Noise Rule

Current Best Aircraft

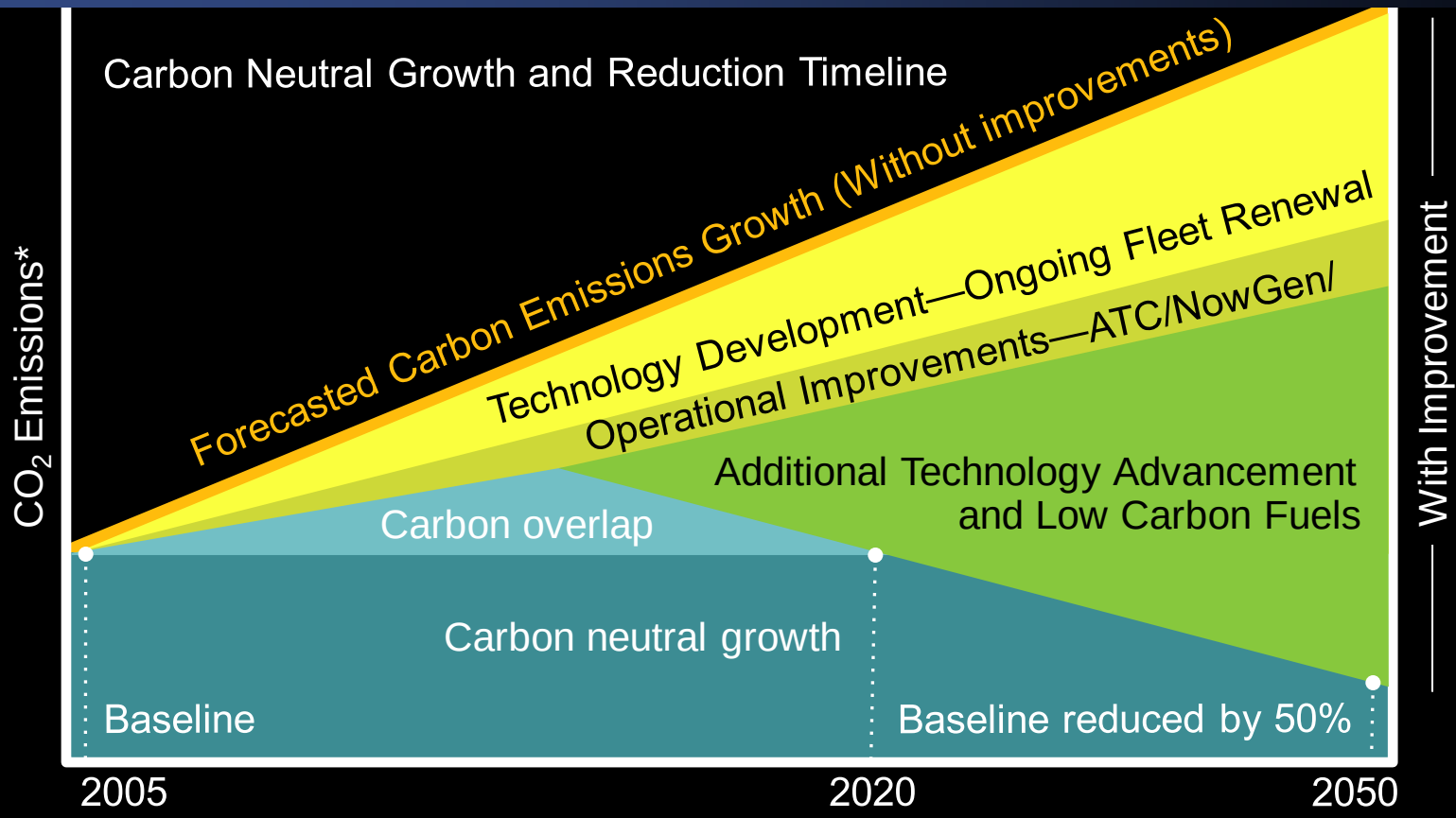
2015 Goal

2025 Goal

Airport Boundary

Ultimate goal: Aircraft noise is completely contained within the airport boundaries

Carbon Emissions

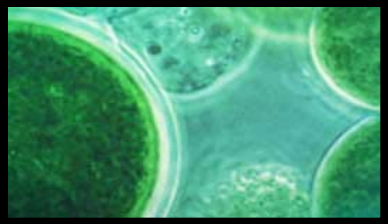


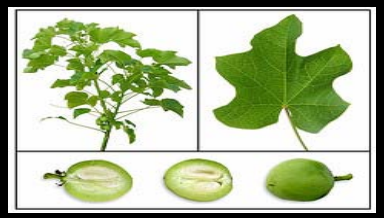
The Way Forward: New Aircraft Technology

Opportunities

- Historically new technology accounts for 90% of environmental footprint reduction
- New concepts offer promise for improvement
- Collaborative demonstrations with industry can stimulate technology transition
- Need a balance in maturing technologies and enabling revolutionary concepts

The Way Forward: Pursuit of New Fuels

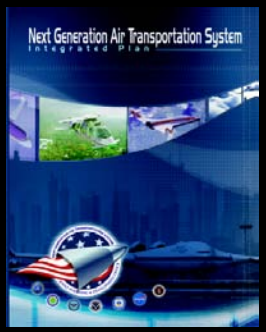




Opportunities

- Synthetic Fuels Offer Environmental & Energy Benefits
- Helps Manage Interdependencies
- Commercial Aviation Alternative Fuel Initiative (CAAFI)
  - *Securing a stable fuel supply*
  - *Furthering research and analysis*
  - *Assessing environmental impacts*
  - *Improving aircraft operations*

The Way Forward: The Essential Partnership



NASA

- Technology research – enable revolutionary concepts
- Alternative fuels research
- Operational procedures research
- Science to understand impacts
- First principles analytical models

FAA

- Technology maturation
- Alternative fuels assessment/certification
- Operational procedures demonstration/advancement
- Science & metrics and measurement techniques to quantify impacts
- Analytical models